

Smart Windows

What is this Technology?

Smart windows can dynamically change light transmission, transparency, and solar heat gain factor. This project compares two smart window technologies - electrochromic windows, which have varied tinting values between 2% and 60% via electronic controls, and a thermotropic organic polymer “window filler” that darkens as surface temperature increases. These are the first federal building installations of this technology.

Why is GSA Interested?



ENERGY EFFICIENCY Preliminary data show that this emerging technology can reduce overall cooling loads by up to 20%. Additionally, the dynamic nature of this glazing may improve the performance of daylight harvesting luminaires, yielding additional energy savings.



COST EFFECTIVENESS The products are new and emerging. Material costs are negotiated as the products do not have standard production runs. Energy savings, occupant behavior, and the potential to reduce HVAC equipment size will be evaluated, and cost / benefit calculated at different price points.



OPERATIONS & MAINTENANCE Thermotropic windows would have operations and maintenance (O&M) similar to conventional windows; electrochromic windows require a controlled power source integrated into the window frame. Occupant acceptance of these products is unknown. Electrochromic windows provide local occupant control, while thermotropic windows do not provide control of their level of tinting.



APPLICABILITY Smart window glazing materials can be adapted to any glazing application (e.g., interior partitions, exterior windows, skylights). The technology is most applicable to new construction and major reconstruction where the capital cost can be offset by the downsized HVAC equipment cost. On a retrofit basis, this technology may be more difficult to justify on a cost/benefit basis.

Measurement & Verification

The Green Proving Ground program has commissioned the Lawrence Berkeley National Laboratory to perform measurement and verification (M&V) on “smart window” technologies at the Denver Federal Center in Denver, Colorado. Findings from that investigation will be available in June 2012.